

REMARKS

Reconsideration of this application is respectfully requested.

1. Independent claims 1 and 8 have been amended by deleting "except for glycol esters and ether amines", which was inserted in the previous amendment and is rejected as introducing new matter.

Claims 9, 10, 13, 16, and 17 have been cancelled.

New claims 18 to 29 have been added. New claims 18 and 19 correspond to claims 2 and 5, respectively. New claim 20 finds support at page 15, lines 16 to 22 of the specification. New claims 21 and 22 find support at page 29, lines 8 to 13 and lines 17 to 25, respectively. New claim 23 finds support at page 16, lines 7 to 12, page 45, lines 22 to 26, and page 47, lines 14 to 20, respectively. New claim 24 finds support at page 53, lines 15 to 21. New claims 25 to 29 correspond to new claims 20 to 24, respectively.

By way of these amendments, Examples 3 to 6 in the original specification are now outside the scope of the present invention, and only Examples 1, 2, and 7 are the working examples of the present invention.

2. Claims 1-2, 5-10, 13 and 16-17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The Examiner points out that the term "except for glycol esters and ether amines" is not supported by the original disclosure.

In response to this rejection, this term has been deleted. With this amendment, the above rejection as well as the objection to the amendment filed September 18, 2009 is overcome.

3. Claims 1-2, 5-10, 13 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake et al., JP Publication No. 2001-316686 in view of Yagishita, US Patent Application Publication No. 2005/0272616.

The present invention, which is a system having DLC contact surfaces at least one of which is coated with a DLC film and containing a lubricant as defined in claim 1 and a method

of lubricating the system with the lubricant as defined in claim 8, is characterized by use of the lubricant essentially containing:

- a lubricant base oil (A) containing a base oil (X) with particular properties,
- a sulfur-containing molybdenum complex (B),
- a particular friction modifier (C), and
- a particular sulfur-free metal detergent (D).

The present invention defined in claims 2 and 18 is characterized by use of the lubricant further containing a phosphorus-based anti-wear agent (E).

The other claims further define the present invention.

According to the present invention, the friction between DLC contact surfaces at least one of which is coated with a DLC film is further reduced and such low friction property is stably maintained. Such advantages of the present invention are demonstrated by both the high temperature detergency and the friction torque reduction rate being superior.

The Examiner points out that Miyake discloses a lubricant for lubricating a pair of sliding surfaces coated with a DLC film, which lubricant contains a mineral or synthetic base oil and additives including molybdenum dithiocarbamate, which corresponds to component (B) of the present lubricant, and zinc dithiophosphate, which corresponds to component (E) of the present lubricant. The Examiner acknowledges that Miyake does not disclose a friction modifier, which corresponds to component (C) of the present lubricant, and a metal detergent, which corresponds to component (D) of the present lubricant.

The Examiner further points out that Yagishita discloses a lubricant composition for use in an internal combustion engine comprising a particular base oil, which includes the base oil (X) of the present lubricant, and additives including neutral alkaline earth metal salicylates, which corresponds to component (D) of the present lubricant, particular friction modifiers, which correspond to component (C) of the present lubricant, and anti-wear additives including metal phosphates, which correspond to component (E) of the present lubricant. That is, the Examiner indicates that all the components of the present lubricant except for component (B) are taught in Yagishita.

It is concluded by the Examiner that it would have been obvious to one of ordinary skill in the art to use the base oil and additives of Yagishita in the lubricant composition of Miyake because all the additives are well known in the art and would conventionally be used to enhance friction, detergency, and anti-wear properties in the lubricant composition.

In response to the Examiner's recognition, the applicant respectfully argues that the object and advantage of the present invention that the friction between DLC contact surfaces at least one of which is coated with a DLC film is further reduced and even maintained stably, are not disclosed in either Miyake or Yagishita. The object of Miyake is to provide low friction and good anti-wear property to sliding members having DLC contact surfaces (see, e.g., paragraph 0011). The object of Yagishita is to provide a lubricating oil composition excellent in oxidation stability under the contamination of water content (see, e.g., paragraph 0006). Neither Miyake or Yagishita teaches to stably maintain the low friction property.

The examples of Miyake merely show that low friction and good anti-wear property may be provided by lubricant containing a base oil, which is not the base oil (A) of the present lubricant, and additives corresponding to components (B) and (E) of the present lubricant. As acknowledged by the Examiner, Miyake does not teach to add components (C) and (D) of the present lubricant.

The Examples of Miyake are similar to Example 6 in the present specification, which is now outside the scope of the present invention, apart from the base oil being different. Referring to Table 1, Example 6 demonstrates that the absence of components (C) and (D) results in inferior high temperature detergency and friction torque reduction rate, in particular the reduction rate at 700 rpm, 100 °C compared to working Examples 1, 2, and 7, so that the low friction property cannot be maintained stably at a high level.

On the other hand, as discussed by the Examiner, Yagishita suggests a lubricant containing components other than (B) of the present lubricant. However, components (C) and (E) are taught merely as part of a variety of optional additives in paragraphs 0053 to 0070. There is no teaching in Yagishita that inclusion of components (C) and (E) in the present lubricant can achieve the object of the present invention. Still less, there is no Example disclosed in Yagishita which uses components (C) and (E). The Examples only show lubricants containing a base oil,

which is described more generally than the base oil (X), and component (D) of the present lubricant.

Assuming arguendo, that the teachings of Miyake and Yagishita are combined as discussed by the Examiner, i.e., supposing that the base oil and component (D) disclosed in the Examples of Yagishita are applied to the lubricants disclosed in the Examples of Miyake, the resulting composition would be a lubricant containing the base oil, components (B), (D), and (E). Experimental data of such a lubricant is not disclosed in the present application, but in view of the fact that component (E) is an option in the present invention as defined in claims 1 and 8, Example 5 in the present specification, wherein the lubricant contains the base oil (A), components (B) and (D) and which is now outside the scope of the present invention, may be referred to for discussing the advantage of the present invention over the lubricant taught by Miyake in view of Yagishita.

Referring to Table 1, Example 5 demonstrates that the absence of component (C) results in an inferior friction torque reduction rate even though the high temperature detergency is sufficient compared to working Example 7, which is also a lubricant without component (E). Thus, Example 5 shows that the low friction property cannot be maintained stably at a high level in the absence of component (C).

As discussed above, even if the teachings of the Examples of Miyake and Yagishita are combined, the object of the present invention to stably maintain at a high level the low friction property of DLC contact surfaces at least one of which is coated with a DLC film, cannot be achieved.

Since Miyake does not even suggest the use of components (C) and (D), and neither Miyake or Yagishita teaches the object of the present invention at all, one of ordinary skill in the art would not have expected to achieve stable maintenance of the low friction property of DLC contact surfaces at least one of which is coated with a DLC film by selecting component (C) from a vast variety of optional additives disclosed in Yagishita.


Therefore, the lubricant containing the particular base oil and components (B) to (D) would not have been obvious to one of ordinary skill in the art over Miyake in view of Yagishita.

Based on the preceding comments and amendments, this application is believed to be in condition for allowance and such action is respectfully requested.

A Request for Continued Examination (and the fee therefore) as well as a petition and the fee for a one month extension of time accompanies this response.

Please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,



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